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Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re
Application of: Ilya Feygin et al.

Serial No. : 08/872,097

Filed : June 10, 1997

For: : METHODS AND APPARATUS FOR UNIVERSAL FLUID EXCHANGE

Group : 1743

Examiner : Le, Long V.

OIPE JC68 APR 27 2000 PATENT & TRADEMARK OFFICE

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Signed: Geraldine Miller

Name: Geraldine Miller

Date: April 25, 2000

Chapel Hill, North Carolina
April 25, 2000

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Assistant Commissioner for Patents
Washington, D.C. 20231

TRANSMITTAL OF APPEAL BRIEF

1. Transmitted herewith in triplicate is the APPEAL BRIEF in this application with respect to the Notice of Appeal filed by First Class Mail on February 23, 2000 and received by the Patent and Trademark Office on February 28, 2000.

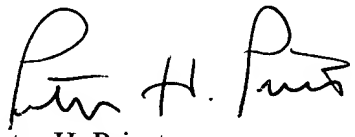
2. The Applicant is a small entity.

3. Pursuant to 37 CFR 1.17(f) the fee for filing the Appeal Brief is $150.

[x] A check in the amount of $150 is enclosed.

[x] The Commissioner is hereby authorized to charge any additional fees which may be required including any fee for extension of time or credit any overpayment to The Law Offices of Peter H. Priest Deposit Account No. 50-1058. Should such an extension become due, this letter constitutes a petition requesting same. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,



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COVER SHEET FOR
APPELLANTS' BRIEF

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Signed: Geraldine Miller

Name: Geraldine Miller

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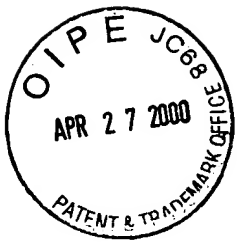

CASES

STATUTES

MISCELLANEOUS

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April 25, 2000

Assistant Commissioner
For Patents
Washington, D.C. 20231

APPELLANT'S BRIEF

Sir:

1. The Real Party In Interest

The real party in interest is the assignee, Pharmacopeia Incorporated.

2. Related Appeals and Interferences

None.

3. Status of the Claims

This is an appeal from the November 23, 1999 final rejection of claims 1-9, 17-29, 35-40 and 47-65. Claims 1-9, 23-29 and 47 were rejected under 35 U.S.C. 103(a) as being

unpatentable over Gleave et al. U.S. Patent No. 5,660,727 (Gleave) in view of Panetz et al. U.S. Patent No. 5,585,068 (Panetz). Claims 17-22, 29 and 35-40 were rejected under 35 U.S.C. 103(a) over Gleave in view of Averette U.S. Patent No. 5,147,551 (Averette). Claims 48-65 were rejected under 35 U.S.C. 103(a) over Gleave in view of Panetz further in view of Park et al. U.S. Patent No. 3,7154,190 (Park). Claims 11-16, 31-34, 41-43, 66 and 67 stand allowed.

4. Status of Amendments

The claims stand as last amended on August 30, 1999.

5. Summary of the Invention

The present invention is entitled "Methods and Apparatus for Universal Fluid Exchange" and is directed to methods and apparatus for simply and cost effectively achieving universal fluid exchange and manipulating one or more reaction vessels. The invention may suitably be employed in combinatorial chemical synthesis reaction systems which are simple, low cost and highly reliable, as claimed in claim 1, for example, but will also be applicable in a wide variety of contexts, as claimed in claim 23, for example. Methods and apparatus in accordance with the present invention may reduce the likelihood of spills and of cross contamination, provide for the effective individual heating of reaction vessels, and supply effective agitation of reactants without substantially grinding up solid particles suspended in the liquid reaction mixture, such as the microscopic beads which support the chemical compounds in combinatorial chemical synthesis, thereby increasing the yield of the synthesis.

In one aspect, as seen in Fig. 1, the invention may suitably comprise a plurality of reaction vessels, such as reaction vessels 10, held in place by reaction vessel supports, such as top reaction vessel support 16 and bottom reaction vessel support 18. The reaction vessel supports include pressure sealed injection and evacuation ports, such as injection port 21 and

evacuation port 23, respectively, for each supported reaction vessel. As shown in Fig. 2B, each injection port may suitably include a pressure seal, such as pressure seal 40. As shown in Fig. 2C, each evacuation port may suitably include a pressure seal, such as the pressure seal formed from the sleeve 60 and the O-ring 56.

Reaction vessels matingly engage through the injection and evacuation ports with injection fittings, such as injection fitting 20 and evacuation fitting 22, which are connected through flexible tubing to respective supplying and receiving vessels. The reaction vessels are moved into position at the respective fittings, as required, so that the reaction vessel may be supplied with reactants from supplying vessels in the order and amount desired and so that the reaction vessels may provide their contents to the appropriate receiving vessels. By moving the vessels, rather than keeping each vessel stationary and supplying a succession of different reagents through a single supply line, fluids may be supplied through dedicated supply lines which will not become contaminated as they will only deliver a single type of fluid. Also, no valves and no complicated tubing arrangements are necessary.

In another aspect, as seen in Fig. 4, the reaction vessels include intake and evacuation ports in their respective tops and bottoms. A ring of such reaction vessels is held in place by carousel plates, such as upper carousel plate 62 and lower carousel plate 64. Upper and lower fitting carousels rotate to mate the desired fittings to the respective reaction vessel ports. Seals may be made simply by clamping so that both vessel holding and vessel sealing, to insure leak-proof liquid injection and drainage, are simply accomplished. Magnetic stirrers may be utilized to provide individually-controlled agitation for each reaction vessel. Spring-loaded resistive heating pads with in-line sensing, wrapped around each reaction vessel, may be employed to

control reaction temperature. In one preferred embodiment, a stirrer actuator and heating pad may be combined in an integral unit.

As discussed in detail at page 10, line 19 through page 12, line 2, liquid may be delivered to and evacuated from any vessel in any sequence desired, under program control. Multiple vessels can be worked on at the same time without the need for a large number of valves to route fluids to a large number of different destinations. Such valving arrangements are susceptible to contamination, cross contamination, and low reliability. Further, unlike a typical prior art approach where a common component, such as the heater of Gleave is employed, one failure does not create a disabling common failure of the system of the present invention.

By way of example, claim 1 addresses:

1. A combinatorial chemical synthesis reaction tool, comprising:

a plurality of reaction vessels,

a reaction vessel support disposed to hold the plurality of reaction vessels in a preferred orientation,

a plurality of injection ports, each injection port including a pressure seal, situated to provide access to one of said reaction vessels, the plurality of injection ports operable for the injection of liquids into said reaction vessels,

a plurality of evacuation ports, each evacuation port including a pressure seal, situated to provide access to one of said reaction vessels, the plurality of evacuation ports operable for the evacuation of fluids from said reaction vessels, and

injection and evacuation fittings formed to matingly engage said respective injection and evacuation ports and to thereby enable the delivery of fluids to the reaction vessels and the evacuation of fluids from said reaction vessels.

6. The Issue For Review

The sole issue for review is whether the pending claims 1-9, 17-29, 35-40 and 47-65 were properly rejected under 35 U.S.C. § and 103 and the standard set forth in M.P.E.P § 706.02 where these claims clearly recite a combination of features not shown and not suggested by Gleave, Panetz, Averette or Park alone, or by any combination of these relied upon items, and where there is no suggestion to modify the proposed combinations of those references to result in the claimed invention.

7. Grouping of Claims

The rejected claims do not stand or fall together. The claims should initially be considered in Groups I-III based upon the differences between the independent claims: namely, Group I, claims 1-9 and 17-22; Group II, claims 23-29 and 35-40; and Group III, claims 47-65. The independent claims 1, 23 and 47 address: a "combinatorial chemical synthesis reaction tool" which among its aspects comprises "reaction vessels", "injection ports", "evacuation ports" and "injection and evacuation fittings" (claim 1); a "universal fluid exchanger" which among its aspects comprises "reaction vessels", "injection ports", "evacuation ports", "injection and evacuation fittings" and an "actuator" (claim 23); and a "combinatorial chemical synthesis tool for providing fluids to a plurality of reaction vessels" (claim 47), respectively.

Further subject matter groupings exist which cut across the above groupings based on the three independent claims. Despite the fact that the dependent claims address a wide variety of different and advantageous features claimed in combination, the Examiner rejected these claims with little detailed explanation other than to generally suggest the further combination is obvious without any specific teaching of the claimed combination, or the desirability of making the

modification suggested by the Official Action. In light of this rejection, a concise response is difficult.

The following additional subject matter groupings are noted: "a supplying vessel" and "flexible tubing connected directly from said injection fitting to said supplying vessel" (claims 5 and 27); "a receiving vessel" and "flexible tubing connected from said evacuation fitting to said receiving vessel" (claims 6 and 28); "a stirring motor" and "a stirring bar located within said reaction vessel" (claims 9 and 35); "electromagnetic coils" and "a tapered whisk stirrer...responsive to varying magnetic fields" (claims 18 and 36); a "resistive heater" (claims 20 and 38); and a "U-valve formed of flexible tubing and connected to regulate the flow of liquids" (claims 22 and 40).

8. Argument

The final rejection under 35 U.S.C. § 103 did not follow M.P.E.P. § 706.02 which states at page 700-9:

> After indicating that the rejection is under 35 U.S.C. 103, there should be set forth (1) the difference or differences in the claim over the applied reference(s), (2) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter, and (3) an explanation why such proposed modification would be obvious.

As will be illustrated below, the claims of the present invention are not obvious in view of the references relied upon by the Examiner.

A. The Art Rejections

The art rejections are not supported by the relied upon art. All of the rejections are based on Gleave in various combinations with Panetz, Averette and/or Park. 35 U.S.C. § 103 which governs obviousness indicates that "differences between the subject matter sought to be patented

and the prior art" are to be assessed based upon "the subject matter as a whole". Analyzing the entirety of each claim, the rejections under 35 U.S.C. §103 are not supported by the relied upon art as addressed further below. Only after an analysis of the individual references has been made can it then be considered whether it is fair to combine teachings. However, as addressed further below, fairness requires an analysis of failure of others, the lack of recognition of the problem, and must avoid the improper hindsight reconstruction of the present invention. Such an analysis should consider whether the modifications are actually suggested by the references rather than assuming they are obvious. The 35 U.S.C § 103 rejections picks and chooses varied elements from multiple separate references, none of which presents any motivation for making the suggested combination. This approach constitutes impermissible hindsight and must be avoided. As required by 35 U.S.C. 103, claims must be considered as a whole. When so considered, the present claims are not obvious.

Gleave is entitled "Automated Analyte Supercritical Fluid Extraction Apparatus", and it addresses improvements relating to the extraction of various analytes from solid matrix samples using a fluid under elevated temperatures and pressures sufficient to cause the fluid to be in a supercritical condition as addressed at Gleave col. 1, lines 20-23 and col. 2, lines 3-14, for example. As an initial matter, this supercritical fluid extraction apparatus of Gleave is a radically different context than the "combinatorial chemical synthesis reaction tool" claimed in claims 1 and 47, and the "universal fluid exchanger" of claim 23.

As seen in Gleave's figures, it appears that a cell, such as cell 22, is brought to a single location where a fluid coupling assembly 141, as seen in Fig. 6A injects fluids. It does not appear that fluid can be injected into multiple reaction vessels or evacuated from multiple reaction vessels as advantageously taught by the present invention. Further, as the Official

Action admits, Gleave does not teach a plurality of injection ports and a plurality of evacuation ports supported by top and bottom support plates.

Gleave then transports a cell to a single oven location where that cell is then heated, rather than heating multiple reaction vessels at the same time. See, for example, col. 7, lines 13-17, where Gleave describes a stepper motor to "sequentially position cells 22 at an indexed location". Such an approach is impracticably time consuming where large numbers of vessels are to be processed and a single failed component results in total machine failure. To sum up, Gleave is not concerned with the supply of a variety of reagents to a plurality of vessels. Thus, Gleave would not even encounter the problem of cross-contamination of supply lines. When considered objectively, Gleave, if anything, teaches away from the present invention.

The remaining references relied upon in the Official Action do not cure Gleave's failings as a reference. Further, it would not be apparent that one would or should combine Gleave which focuses on supercritical fluid extraction with the other items which address different contexts and different problems. The claims on appeal are not obvious based upon Gleave taken in combination with the other items relied upon.

Panetz is entitled "Apparatus for Automatically Separating a Compound from a Plurality of Discrete Liquid Specimens" and it is directed to "filtering or extracting constituents from solutions or solids". Col. 1, lines 11 and 12. Panetz delivers "sample preparation columns 50" into a transport disc 40. These columns 50 are best seen in Fig. 3 (side view) and Fig. 5 (top view). As discussed at col. 4, lines 24-27 of Panetz, "the term 'sample preparation column' is meant to include any form of housing having an inlet port and an outlet port with some mechanical or chemical material for removing at least one substance from a fluid passing through the column." Such "columns" do not appear to meet the presently claimed "reaction vessels", but

perhaps more importantly these columns and the overall arrangement of Panetz do not meet the presently claimed injection and evacuation ports and their respective fittings. As seen in Panetz Fig. 13, reagent "is delivered from a bottom orifice 107 of reagent nozzle 105 when reagent nozzle 105 is in the DISPENSE position". Col. 6, lines 62-64. A pressure head 70 comes into play when it is desired to deliver pressurized gas. Col. 7, lines 5-8. Like Gleave (supercritical fluid extraction), Panetz (automatic separation) addresses a distinctly different context than the present invention (combinatorial chemical synthesis reaction or universal fluid exchange).

The remaining references are relied upon to pick and choose features in an improper hindsight reconstruction of the present invention. More particularly, the Official Action recognizes various deficiencies of both Gleave and Panetz as references with respect to the present claims. Specifically, the Official Action admits that Gleave does not teach a plurality of injection ports and a plurality of evacuation ports supported by top and bottom support plates, and a stirrer motor positioned adjacent a sidewall of the vessel. The Official Action further indicates that neither Gleave nor Panetz teach a reaction vessel comprising an additional inlet. However, despite the admitted failings of the cited art, the Official Action concludes that claims 1-9, 17-29, 35-40 and 47-65 are obvious therefrom. These items represent failure of others to both recognize the problems addressed by the present invention, and to solve those problems in the advantageous manner presently claims. This failure constitutes evidence of nonobviousness.

Park and Averette do not cure the deficiencies of Gleave and Panetz. With respect to claims 17-22, 29 and 35-40, Gleave's integral single position heater is a teaching contrary to the proposed combination with Averette. As noted above, Gleave teaches an arrangement in which each sample is rotated to a single location for heating. Gleave represents a rejection of the

separate heater approach of Averette, and it is not clear that Averette's heating arrangement could be applied to supercritical fluid extraction.

Park, on the other hand, is cited to cure the admitted deficiencies of Gleave and Panetz to teach a reaction vessel comprising a second inlet. Park is not in any way comparable to the present claims. Park is entitled "System for the Solid-Phase Peptide Synthesis". It does not address combinatorial chemistry. As seen in Fig. 1, Park shows a series of reservoirs and a complicated series of three-way stop-cocks 21. Solvents or reagents are fed through an apparently stationary reaction vessel A. To change mixes of reagents or solvents, Park's system would apparently have to be disassembled and washed or otherwise flushed out in a complicated manner. As Park is based on totally different principles, its selection and application here represents a clear hindsight reconstruction of the present claims.

Quite simply, Gleave, Panetz, Averette and Park do not show and do not suggest an "combinatorial chemical synthesis reaction tool, comprising: a plurality of reaction vessels, a reaction vessel support disposed to hold the plurality of reaction vessels in a preferred orientation, a plurality of injection ports, each injection port including a pressure seal, situated to provide access to one of said reaction vessels, the plurality of injection ports operable for the injection of liquids into said reaction vessels, a plurality of evacuation ports, each evacuation port including a pressure seal, situated to provide access to one of said reaction vessels, the plurality of evacuation ports operable for the evacuation of fluids from said reaction vessels, and injection and evacuation fittings formed to matingly engage said respective injection and evacuation ports and to thereby enable the delivery of fluids to the reaction vessels and the evacuation of fluids from said reaction vessels" as claimed in claim 1, by way of example. Nothing in the cited references indicates a recognition of the problems addressed by the present invention. Further,

nothing in the cited references indicates a structure which would solve the problems advantageously solved by the present invention. The claims of the present invention are not taught, are not inherent, and are not obvious in light of the art relied upon. It is further noted that the picking and choosing of features from these disparate references bespeaks a hindsight rejection of the claims which must be avoided.

B. The Examiner's Findings of Obviousness are Contrary to Law of the Federal Circuit

As shown above, the invention claimed is not suggested by the relied upon prior art. The references cited by the Examiner, if anything, actually teach away from the present invention. It is only in hindsight, after seeing the claimed invention, that the Examiner could combine the references as he did. This is improper under the law of the Federal Circuit, which has stated that "[w]hen prior art references require selective combination by the Court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself." Uniroyal, Inc. v. Ludkin Riley Corp., 5 U.S.P.Q. 2d 1434, 1438 (Fed. Cir. 1988), cert. den., 102 L.Ed. 2d 51 (1988); quoting Interconnect Planning Corp. v. Feil, 227 U.S.P.Q. 543, 535 (Fed. Cir. 1985). Furthermore, "[i]t is impermissible to use the claims as a frame and the prior art references as a mosaic to piece together a facsimile of the claimed invention." Uniroyal Inc. v. Ludkin Riley Corp., 5 U.S.P.Q. 303, 312 (Fed. Cir. 1983), cert. den., 469 U.S. 851 (1984). Similarly, "[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." In re Laskowski, 10 U.S.P.Q. 2d 1397, 1398 (Fed. Cir. 1989), quoting In re Gorgon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). No such suggestion is found here.

In addition, the Examiner does not appear to have considered "where the references diverge and teach away from the claimed invention", Akzo N.V. v. International Trade Commission, 1 U.S.P.Q. 2d 1241, 1246 (Fed. Cir. 1986), cert. den., 482 U.S. 909 (1987); and W.L. Gore Associates, Inc., 220 U.S.P.Q. at 311; nor has the Examiner read the claims as a whole, as required by statute. 35 U.S.C. 103. See also, Smithkline Diagnostics Inc. .v Helena Laboratories Corp., 8 U.S.P.Q. 2d 1468, 1475 (Fed. Cir. 1988); and Interconnect Planning Corp. v. Feil, 227 U.S.P.Q. at 551.

In In re Laskowski, 10 U.S.P.Q. 2d 1397, the Federal Circuit reversed an obviousness rejection of the claims in an application for a bandsaw. The claimed bandsaw used a pulley type wheel loosely fitted with a tire. The primary reference showed a similar bandsaw where the band was tightly fitted. The Federal Circuit stated that the prior art did not provide a suggestion, reason or motivation to make the modification of the reference proposed by the Commissioner. Id. at 1398. The Court added that "there must be some logical reason apparent from the positive, concrete evidence of record which justifies a combination of primary and secondary references." Id. quoting In re Regal, 188 U.S.P.Q. 136, 139 (C.C.P.A. 1975), citing In re Stemniski, 170 U.S.P.Q. 343 (C.C.P.A. 1971).

In Uniroyal Inc. v. Ludkin Riley Corp., 5 U.S.P.Q. 2d 1434, the Federal Circuit reversed the District Court's finding that the claims for a patent for an air flow deflecting shield were obvious. Without any suggestion in the art, the District Court improperly chose features from several prior art references to recreate the claimed invention.

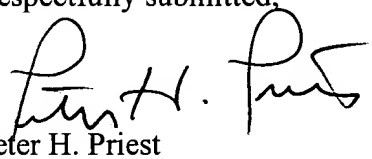
The Examiner's rejection suggests that the Examiner did not consider and appreciate the claim as a whole. The claims disclose a unique combination with many features and advantages not shown in the art. It appears that the Examiner has oversimplified the claims and then

searched the prior art for the constituent parts. Even with the claims as a guide, however, the Examiner has not recreated the claimed invention.

9. Conclusion

The rejection of claims 1-9, 17-29, 35-40 and 46-65 should be reversed and the application promptly allowed.

Respectfully submitted,



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APPENDIX

(Claims Under Appeal)

1. A combinatorial chemical synthesis reaction tool, comprising:

a plurality of reaction vessels,

a reaction vessel support disposed to hold the plurality of reaction vessels in a preferred orientation,

a plurality of injection ports, each injection port including a pressure seal, situated to provide access to one of said reaction vessels, the plurality of injection ports operable for the injection of liquids into said reaction vessels,

a plurality of evacuation ports, each evacuation port including a pressure seal, situated to provide access to one of said reaction vessels, the plurality of evacuation ports operable for the evacuation of fluids from said reaction vessels, and

injection and evacuation fittings formed to matingly engage said respective injection and evacuation ports and to thereby enable the delivery of fluids to the reaction vessels and the evacuation of fluids from said reaction vessels.

2. The reaction tool of claim 1, wherein said injection port is located at the top of said reaction vessel.

3. The reaction tool of claim 2, wherein said evacuation port is located at the top of said reaction vessel.

4. The reaction tool of claim 2, wherein said evacuation port is located at the bottom of said reaction vessel.

5. The reaction tool of claim 1, further comprising:

a supplying vessel, and flexible tubing connected directly from said injection fitting to said supplying vessel.

6. The reaction tool of claim 5, further comprising:

a receiving vessel, and

flexible tubing connected directly from said evacuation fitting to said receiving vessel.

7. The reaction tool of claim 1, wherein said evacuation port is a spring-loaded port.

8. The reaction tool of claim 1, wherein said reaction vessel support comprises:

top and bottom vessel support plates with tapered injection through fittings.

9. The reaction tool of claim 8 further comprising an actuator to selectively control movement of the top and bottom vessel support plates.

17. The reaction tool of claim 1, further comprising:

a stirring motor with a magnet attached to its shaft, said magnet positioned adjacent a sidewall of said reaction vessel; and

a stirring bar located within said reaction vessel, said stirring bar tending to follow the rotation of said magnet.

18. The reaction tool of claim 1, further comprising:

electromagnetic coils mounted around the outside of said reaction vessel, and

a tapered whisk stirrer located within said reaction vessel, said stirrer being responsive to varying magnetic fields produced by said push-pull coils by rotating within said reaction vessel, thereby stirring the contents of said vessel.

19. The reaction tool of claim 1, further comprising:

electromagnetic push-pull coils mounted adjacent the outside of said reaction vessel, and

a floating stirrer located within said reaction vessel said stirrer being responsive to varying magnetic fields produced by said push-pull coils by rotating within said reaction vessel, thereby stirring the contents of said vessel.

20. The reaction tool of claim 1, further comprising:

a resistive heater which snaps on to the exterior of said reaction vessel.

21. The reaction tool of claim 20, wherein said resistive heater includes means for selective on-line control.

22. The reaction tool of claim 1, further comprising a U-valve formed of flexible tubing and connected to regulate the flow of liquids from said evacuation through fitting.

23. A universal fluid exchanger comprising:

a plurality of reaction vessels;

a reaction vessel support disposed to hold the plurality of reaction vessels in a preferred orientation;

a plurality of injection ports, each injection port including a pressure seal, situated to provide access to one of said reaction vessels, the plurality of injection ports operable for the injection of liquids into said reaction vessels;

a plurality of evacuation ports, each evacuation port including a pressure seal, situated to provide access to one of said reaction vessels, the plurality of evacuation ports operable for the evacuation of fluids from said reaction vessels;

injection and evacuation fittings formed to matingly engage said respective injection and evacuation ports and to thereby enable the delivery of fluids to the reaction vessels and the evacuation of fluids from said reaction vessels; and

an actuator for controlling selectively aligning the injection and evacuation ports of the plurality of reaction vessels and the injection and evacuation fittings, respectively.

24. The fluid exchanger of claim 23, wherein said injection port is located at the top of said reaction vessel.

25. The fluid exchanger claim 24, wherein said evacuation port is located at the top of said reaction vessel.

26. The fluid exchanger of claim 24, wherein said evacuation port is located at the bottom of said reaction vessel.

27. The fluid exchanger of claim 23, further comprising:

a supplying vessel; and

flexible tubing connected directly from said injection fitting to said supplying vessel.

28. The fluid exchanger of claim 23, further comprising:

a receiving vessel; and

flexible tubing connected directly from evacuation fitting to said receiving vessel.

29. The fluid exchanger of claim 23, wherein said evacuation post is a spring-loaded port.

35. The fluid exchanger of claim 23, further comprising:

a stirring motor with a magnet attached to its shaft, said magnet positioned at the sidewall of said reaction vessel; and

a stirring bar located within said reaction vessel, said stirring bar being responsive to the rotation of said magnet by similarly rotating.

36. The fluid exchanger of claim 23, further comprising:

electromagnetic coils mounted to the exterior of said reaction vessel; and

a tapered whisk stirrer located within said reaction vessel, said stirrer being responsive to varying magnetic fields produced by said coils by rotating within said reaction vessel, thereby stirring the contents of said vessel.

37. The fluid exchanger of claim 23, further comprising:

electromagnetic coils mounted to the exterior of said reaction vessel; and

a floating stirrer located within said reaction vessel said stirrer being responsive to varying magnetic fields produced by said coils by rotating within said reaction vessel, thereby stirring the contents of said vessel.

38. The fluid exchanger of claim 23, further comprising:

a resistive heater which snaps on to the exterior of said reaction vessel.

39. The fluid exchanger of claim 38, wherein said resistive heater includes a controller for on-line control.

40. The fluid exchanger claim 23, further comprising a U-valve formed of flexible tubing and connected to regulate the flow of liquids from said evacuating through fitting.

47. A combinatorial chemical synthesis reaction tool for providing fluids to a plurality of reaction vessels, comprising:

a reaction vessel support adapted to hold the plurality of reaction vessels in a preferred orientation,

an injection port, including a pressure seal, situated to provide access to each one of the reaction vessels for the injection of liquids into said reaction vessels,

an evacuation port, including a pressure seal, situated to provide access to each one of the reaction vessels for the evacuation of fluids from said reaction vessel, and

injection and evacuation fittings formed to matingly engage said respective injection and evacuation ports and to thereby enable the delivery of fluids to the reaction vessels and the evacuation of fluids from said reaction vessels.

48. The reaction tool of claim 47 further comprising the plurality of reaction vessels and wherein at least one of the reaction vessels comprises:

an enclosed vessel having a first inlet and a second inlet disposed proximately to a first end thereof, and an outlet disposed proximately to a second end thereof;

a first stopcock disposed within the first inlet; and

a second stopcock disposed within the outlet, said at least one reaction vessel adapted for ready insertion and removal from the reaction vessel support.

49. The reaction tool of claim 48 wherein the reaction vessel further comprises:

means for preventing solid phase material from escaping from the reaction vessel via the outlet while allowing fluid to flow through the outlet.

50. The reaction vessel of claim 49 wherein said means comprises a first frit disposed within the vessel at the second end thereof so as to prevent solid phase materials from escaping from the vessel via the outlet.

51. The reaction vessel of claim 50 wherein the distance between the first frit and the outlet is less than the thickness of the first frit.

52. The reaction vessel of claim 48 further comprising means for preventing solid phase material from escaping from the reaction vessel via the first inlet, while allowing fluid to enter the vessel via the first inlet.

53. The reaction vessel of claim 50 further comprising a second frit disposed within the first inlet.

54. The reaction vessel of claim 48 wherein the reaction vessel comprises glass.

55. The reaction vessel of claim 54 wherein the glass is strengthened adjacent to said outlet.

56. The reaction vessel of claim 48 wherein the outlet extends at an angle from a central axis extending lengthwise through the reaction vessel.

57. The reaction vessel of claim 56 wherein said angle is less than or equal to ninety degrees.

58. The reaction vessel of claim 56 wherein the second inlet extends at an angle from a central axis extending lengthwise through the reaction vessel.

59. The reaction vessel of claim 48 wherein the second inlet comprises a ground upper section adapted to receive a stopper therein thereby sealing the second inlet.

60. The reaction vessel of claim 48 wherein the second inlet comprises a threaded end adapted to receive a threaded cap.

61. The reaction vessel of claim 60 wherein the threaded end or cap comprises Teflon.

62. The reaction vessel of claim 48 wherein said vessel is enclosed by an outer hollow shell comprising an outer wall and an inner wall defining a liquid tight space therebetween.

63. The reaction vessel of claim 62 further comprising a fluid inlet adapted to allow fluid to flow within said hollow shell, and a fluid outlet adapted to allow fluid to flow out of said hollow shell.

64. The reaction tool of claim 47 further comprising the plurality of reaction vessels and wherein at least one of the reaction vessels comprises:

an enclosed vessel having a first inlet and a second inlet disposed proximately to a first end thereof, and an outlet disposed proximately to a second end thereof:

a first stopcock disposed within the first inlet;

a second stopcock located within the outlet; and

an outer hollow shell surrounding the interior reaction volume of the reaction vessel, said at least one reaction vessel adapted for ready insertion and removal from the reaction vessel support and custom fitting said support.

65. The reaction tool of claim 64 wherein the reaction vessel further comprises:

means for allowing fluid to flow through said outer hollow shell.